EFFECT OF LOW IMPACT EXERCISES WITH BEHAVIORAL RELAXATION THERAPY ON TREMORS, UPPER LIMB FUNCTION AND DISABILITY IN PATIENTS WITH PARKINSON'S DISEASE

SHORT SYNOPSIS

Submitted in partial fulfillment of the requirement of the degree of

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by

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20/Ph.D./001

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Certificate

I hereby declare that the short synopsis "Effect of low impact exercises with behavioral relaxation therapy on tremors, hand function and disability in patients with Parkinson's Disease" being submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Physiotherapy under faculty of Allied Health Sciences of Manav Rachna International Institute of Research & Studies, Faridabad during the academic year 2022. It is a bona fide record of original work carried out under the supervision of Dr. Nitesh Malhotra and has not been submitted in full or part to any other university or institute for degree or diploma. Further, it is certified that short synopsis is plagiarism free and the proof has been submitted.

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ABSTRACT

Background: The Parkinson's Disease (PD) is a "complex neurodegenerative disorder, a second most common neurodegenerative disorder next to Alzheimer's disease caused by deficiency of a neurochemichal 'Dopamine' in the nigrostriatum system". Tremor is a major motor cardinal symptoms in parkinson's. The current pharmacological treatments carbidopa and levodopa combination, Anticholinergics and surgical interventions deep brain stimulation, Stereotactic thalamotomy are choice of treatment in severe cases and less published evidence on tremors. Clinical findings suggests that tremor increased by stress and usually physiotherapist suggests patients to practice meditation, yoga, breathing exercises and other relaxation techniques to reduce tremor. **Objectives:** The study will investigate effect of low impact exercises with behavioral relaxation therapy techniques on Parkinson's tremor. **Methodology :** It will be a prospective experimental Randomized control study . 30 Hoehn and Yahr scale Stage III-IV Parkinson's, and tremor dominating patients were randomly allocated into experimental and control group. Pre and post tests will be taken using Fahn's Tremor rating scale (FTRS) , Bain and Findley Tremor ADL Scale ,9 hole peg test. Interventional Group will receive low impact exercises with Behavioral Relaxation Therapy (BRT) Techniques and Control group will receive conventional physiotherapy protocol and relaxation exercise thrice a week for 6 weeks under supervision of Physiotherapist and follow up after 6 weeks.

Keywords : Low impact exercises ,Behavioral Relaxation Therapy, Tremor, Upper limb function, Disability, Parkinson's Disease.

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List of Abbreviations

PD	Parkinson's Disease
ADL	Activities of Daily Living
BRT	Behavioral Relaxation Therapy
UPDRS	Unified Parkinson's Disability Rating Scale
AAC	Active assisted cycling
FTRS	Fahn's Tremor Rating scale
9HPT	9 Hole Peg Test
BRS	Behavioral Relaxation Scale
HRR	Heart Rate Reserve

1: Introduction

Parkinson's Disease

Parkinson's Disease (PD) is a complex neurodegenerative disorder. National Institute of Neurological Disorders and Stroke (NINDS) defines " Parkinson's disease (PD) belongs to a group of conditions called motor system disorders, which cause unintended or uncontrollable movements of the body. The precise cause of the disease is unknown, but some cases are hereditary while others are thought to occur from a combination of genetics and environmental factors that trigger the disease". This is the second commonest neurodegenerative disorder next to Alzheimer's disease (Schapira & Olanow, 2004). PD is progressive in nature and the motor symptoms in patients like tremor , bradykinesia, rigidity, and postural instability accelerates the decline in functional independence, when it is associated with sedentary life style.

It is estimated that worldwide nearly 6.3 million have Parkinson's. The onset is usually at over 60 years of age and it is estimated that one in 10 are diagnosed before 50 years of age. It can be seen rarely in younger people i.e less than 30 years of age, and the risk increases with increase in age. Men are slightly more affected than women. It is estimated that 5-10% of patients experiences symptoms before the age of 40. (Kasten et al., 2007)

There are very less epidemiological studies on prevalence of PD in India. Prevalence of 33 per 1,00,000 was found by door to door survey in Bangalore district of Karnataka, India (Gourie-Devi et al., 2004)

Deficiency of a neurochemichal 'Dopamine' in the nigrostriatum system due to degeneration of dopaminergic neurons of substantia nigra is the main cause of PD. (Surmeier, 2018).Patients with PD experiences more difficulties in Daily Living Activities , Locomotion like posture, balance, gait (Kwakkel et al., 2007). This results in decreased functional independence, sedentary and social isolation effects quality of life.

The 'Gold standard' treatment of PD is traditionally centered on pharmacological therapy, with Levodopa (Rascol et al., 2002). However, even with regular medication, patients still experiences a detoriation of functional activities and participation. Physiotherapy is becoming key role in treating Balance disturbances, Posture and functions of ADL in patients.

Tremors in Parkinson's

Tremor is most commonly seen motor cardinal symptoms in Parkinson's and it is a rhythmical, involuntary oscillatory movement of a body part. Approximately 50% of patients experience tremors in the disease course; around 9% never experienced tremors (Koller & Huber, 1989). Classical pin roll tremors can be seen and few may experience postural or essential tremors. The classical Parkinson's tremor presents with 4-7 Hz frequency and commonly present at hands or arms. Appearance and frequency of tremor aggravates by stress and anxiety (Zach et al., 2015). Typically resting tremor presents in PD which was least responded to the pharmacological intervention. Tremors are one of the major concerns for the persons with PD as it limits their activity and participation. Even though it subsides during activity, it disturbs Activity of Daily living of the persons with disability. When a person is trying to take food to mouth, till reaching near the mouth a person can hold the food and during the gap of opening mouth he/she starts spilling food due to tremor. It may limit social participation due to shame or stigma.

The tremor in Parkinson's is typical in few features like its inconsistent and not homogeneous, it may disappear at end stage of PD, occurs predominantly at rest and amplitude increases with physical or psychological stress (Deuschl et al., 1998).

Pharmacological and Surgical Management of Parkinson's Tremor

The current pharmacological treatment for PD is carbidopa and levodopa combination, but its effect on tremor is variable. Anticholinergics like trihexyphenidyl hydrochloride and benztropine mesylate can be useful on tremors. But few clinical studies suggests that this may be poorly tolerated in older patients (Koller & Huber, 1989). Stereotactic thalamotomy, Deep brain stimulation is also a choice of surgical management for tremors in PD with limited published evidence.

Malling et al. (2019) stated that " transcranial pulsed electromagnetic fields decreased inter hand coherence and tremor with unilateral postural tremor, while no effect was found for the entire PD group".

Non Pharmacological Management of Parkinson's Tremor

Various non pharmacological treatments were found effective in treating tremors in PD. A systematic review (O'Connor & Kini, 2011) on non pharmacological, non surgical interventions for tremors, identified strength training ,neuromuscular physiotherapy, and functional electrical

stimulation as applicable methods of treatment. various tremor suppressing orthosis, vibration therapies, and few other therapies need further research for their efficacy in managing tremors and improving activity in persons with PD.

Tremor and Relaxation Techniques

The neurophysiological relation in PD tremors are complex and poorly understand. Appearance and frequency of tremor in PD aggravates by stress and anxiety. Even though there is limited published evidence on stress induced PD in tremors, in our clinical practice it's well known that patients with PD complains with increased tremors with physical or psychological stress. Adrenergic activation may play role in tremors (Morgan et al., 2017)

The characteristics of muscle relaxation tasks changes seen in PD depends on the severity symptoms including bradykinesia , resting tremor and rigidity .This can be measured by time required relaxation of muscle from baseline to zero. This relaxation time is extended in PD patients. (Jordan et al., 1992) This might be due to presynaptic inhabitation in spinal cord is reduced in PD patients.

In practice physiotherapist suggests PD patients to practice meditation, yoga, breathing exercises and other relaxation techniques to reduce tremor.

Various relaxation therapies are developed and practiced to alleviate stress and anxiety in different pathologies and health problems. There are few relaxation techniques like progressive muscle relaxation technique developed by Jacobson, autogenic inhibition training developed by Schulz and controlled breathing techniques widely used clinically etc.

Behavioral Relaxation Therapy (BRT)

BRT is "behavior analytically based procedure used for teaching 10 overt relaxed behaviors" (Poppen & Maurer, 1982). In this training, patients acquire and proficient by phased learning through verbal instructions, imitating, prompting, feedback, shaping and reinforcement. Patients are taught with 10 relaxed overt behaviors of eyes , head, throat, shoulders, hands, foot,body, mouth and quiet breath. Practice of these relaxed and controlled postures showed decreased electro myographic activity (Poppen & Maurer, 1982). BRT was proved to be effective in treating anxiety and tremor severity of subjects with essential tremor (ET) (Chung et al., 1995) and neuro degenerative conditions (Lundervold et al., 2013).

Exercise has emerged as a promising non-pharmacological intervention to manage the symptoms and improve the overall quality of life for individuals with PD. However, the majority of studies have focused on high-intensity and vigorous exercises, neglecting the potential benefits of low-impact exercises. This knowledge gap necessitates a comprehensive study to investigate the efficacy and feasibility of low-impact exercises specifically tailored for individuals with PD.

Recent systematic reviews have highlighted flaws and publication bias in psychological interventions such as BRT, necessitating high-quality studies with low risk of bias to ascertain their true effectiveness, especially in low resource settings.(Lim & Tierney, 2023) Additionally, there is a lack of research on the effectiveness of low impact exercises for the management of PD.

Therefore, there is a critical need for a comprehensive research study that investigates the combined effect of low-impact exercise and BRT for the management of PD symptoms. This study aims to fill the existing research gap by examining the efficacy, feasibility, and synergistic effects of integrating low-impact exercise with BRT in individuals with PD.

2. Literature Review

Symptoms of Parkinson's

Cholewa et al., 2013 In their experimental study on 70 patients of stage III Hoen and Yhar scale PD evaluated the effect of movement rehabilitation on decreasing motor symptoms severity in Parkinson's. Disease severity were measured with UPDRS Parts I-III and ADL by using Schwab and England scale, PDQ 39. Intervention group received 60 minutes of rehabilitation exercise consisting of movement ranges, balance, movement agility and walking exercises twice a week for twelve weeks. UPDRS Part I, II and III score was decreased by 17.31%, 22.2% and 18.96% respectively, PDQ decreased by 17.12% and 9.69%.increase in Schwab and England scale .This shows rehabilitation programme decreased motor symptoms severity and improved QOL.

Cherup et al., 2021 Compared the effectiveness of Yoga meditation and an Proprioceptive programme on patients diagnosed with Parkinson's Disease. Both the interventions were twice weekly sessions for 12 weeks and Joint position sense, Joint kinesthesis, TIN, FES, BESS, and TUG were used as outcome measures. Results showed statistically significant difference between group favoring the Yoga group and no negative effects were reported. This indicates that Yoga Meditation programme can be included in therapy for patients with PD.

Physiotherapy Management in Parkinson's Tremor

Ravichandran et al., 2016 In a cross sectional study compared the efficacy between stretching exercise and propriceptive loading on 30 patients with intentional tremor due to cerebellar lesion. Fahn's tremor rating scale for tremors and nine hole peg test for hand dexterity were used as outcome measures. They found that Proprioceptive loading exercise has reduced cerebellar tremor significantly and improved the muscle coordination in reaching activities when compared to stretching exercises in patients with cerebellar tremors.

Hao et al., 2017 Studied effect of activating cutaneous afferents using TENS on inhibition of tremor in patients with PD. They have recruited 8 PD patients with tremor as dominant symptom and applied TENS on skin of dorsal hand which is innervated by radial nerve and Resting tremor and EMG of muscles of upper limbs were recorded. They observed suppression of 61.5% in

tremor in upper limb joints and 47.97% in EMG of all upper limb muscles. It proved that the upper extremity tremor of PD patients can be inhibited with evoked cutaneous stimulation.

Dosen et al., 2015 Proposed that tremor suppression strategy that detects tremor from EMG signals of the tremor originating muscle and counteraction by motor and sensory electrical stimulus to the antagonist muscles. They tested it on 4 PD and 2 Essential tremor patients with majorly wrist flexion and extension muscles tremor and observed 46 - 81% and 35 - 48% tremor suppression when using motor and sensory stimulus respectively. This demonstrated that tremor suppression can be achieved by electrical stimulus below motor threshold without discomfort of patients and minimal muscle fatigue

Ridgel et al., 2012 In their before and after pilot study on 10 idiopathic PD patients ,studied effect of active assisted cycling(AAC) by motorized bike on improving tremor and bradykinesia. Outcome measures used were heart rate, pedaling power, rating of perceived exertion , tremor scoring during postural and kinetic tremor. They have concluded that AAC can be incorporated in therapy to examine the motor function changes in subjects with PD

Casciaro, 2016 In a case report of 63 year female idiopathic parkinson's patient of Hoehn Yahr IV Stage was managed with massage therapy. Motor impairments tremor and rigidity were assessed with scale SPES/SCOPA pre and post treatment. The massage therapy and general relaxation techniques induced soothing environment and decrease muscle tone. They indicated that "massage therapy had a positive effect on resting and postural tremor and short time reduction in rigidity in patients with PD"

Neurophysiological Physiotherapy Management in Parkinson's Tremor

Blakemore et al., 2019 In their study examined changes in tremor characteristics using triaxis accelerometer and surface EMG during voluntary suppression in 37 Parkinson's patients with resting tremor in upper limbs. They observed reduction in tremor amplitude during attempted tremor suppression. They proved that the act of will can suppress resting tremor and significance of conscious control over PD tremor.

Son & Choi, 2018 In a RCT, Examined the effectiveness of meditation and exercise in relieving the symptoms of PD patients. 63 PD patients were randomly recruited in control and

experimental group. Experimental group was undergone 8 week mindfulness meditation based complex exercise programe . Outcome measures of motor symptoms were chair stand test ,6 MWT & elastic band pull test for and for non motor symptoms The state Trait Anxiety Inventory (STAI) , Geriatric Depression scale, and PDQL. Significant improvement was found in control group and concluded that MMBCEP is associated with improved symptoms and QOL in subjects with PD.

Schlesinger et al., 2009 In their study compared the effectiveness of Relaxation guided imagery technique and Relaxing music therapy on 20 Parkinson's patients with severe to moderate tremor symptoms. Tremor was monitored objectively using accelerometer. Pre post assessment showed dramatically decrease in tremor and 15 patients of RGI group completely abolished tremor for 1-13 min. relaxation music also significantly reduced tremor but for short duration. Authors concluded that relaxed guided imagery technique can be used with pharmachological management for tremors in subjects with Parkinson's.

Macht, M et al., 2000 Observed in their pilot study the effectiveness of a systematic relaxation training and classical music therapy in subjects with PD. One group of 12 subjects treated with progressive systematic relaxation training with respiratory relaxation another group of 12 subjects received relaxing music only and subjects were assessed with subjective rating of tremor, rigidity, akinesia and mental relaxation. Subjective variables were improved in both the groups showed improvement and results indicated that the systematic progressive relaxation training and classical music therapy may be effective to control stress induced by motor symptom of Parkinson's.

Outcome Variables of the study

Ondo W et al., 2018 in a cross sectional study evaluated the current state of outcome measures in Parkinson's disease (PD) research and provide a comprehensive analysis of their effectiveness, reliability, and validity. He compared the Fahn-Tolosa-Marin Clinical Rating Scale and the Essential Tremor Rating Assessment Scale and found The test re-test reliability of Fahn-Tolosa-Marin Clinical Rating Scale for Tremor (FTM) was ≥0.74.

Elble et al., 2013 in their review on scales for screening and evaluating tremor, recommended 5 tremor severity assessing scales i.e the Bain and Findley Clinical Tremor Rating Scale ,the FTRS & other 3 scales, the Bain and Findley Tremor ADL Scale (for ADL), Quality of Life in Essential Tremor Questionnaire (for Quality of life) on the basis of availability, psychometric properties, acceptability.

Earhart et al., 2011 examined a commercial 9 HPT on a 262 Parkinson's patients to evaluate test-retest reliability. They found mean time to complete the test was 31.4+_15.7 sec and 32.2+_ 12.4 sec dominant and non dominant hand respectively. The test re test reliability of 2 trails was high (ICC2,1 = 0.88 AND 0.91.They found that 9 HPT is a clinically useful test for assessing upper extremity dexterity function in patients with Parkinson's.

Wang et al., 2011 in their study compared Rolyan nine (9) Hole peg test & Grooved Pegboard test. They assessed 340 subjects test score range and the test retest reliability and concurrent validity. They observed test re test reliability coefficients of 0.92 & 0.95 for left & right hand respectively.

3. Description of Broad Area of Research:

1. Broad area of study defines the rehabilitation strategies using physiotherapy techniques of treatment in Parkinson's rehabilitation.
2. Rehabilitation methods which will improve the tremors in Parkinson's Disease
3. Neurophysiological approaches like low impact exercises and relaxation techniques etc for Tremors in Parkinson's

4. Objectives of the study:

a. To find out the effect of low impact exercise and behavioral relaxation therapy on tremor, upper limb function and disability in patients with Parkinson's.

b. To find out the effect of conventional physiotherapy management on tremor, upper limb function and disability in patients with Parkinson's.

c. To compare the effect of low impact exercises with behavioral relaxation therapy versus conventional physiotherapy management on tremor, upper limb function and disability in patients with Parkinson's.

Hypothesis

Alternate Hypothesis H_1:

a. There will be a significant effect of low impact exercises with behavioral relaxation therapy in management on tremor, upper limb function and disability in patients with Parkinson's.
b. There will be a significant effect of conventional physiotherapy management on tremor, upper limb function and disability in patients with Parkinson's.
c. There will be a significant difference between effect of low impact exercises with behavioral relaxation therapy versus conventional physiotherapy management on tremor, upper limb function and disability in patients with Parkinson's.

Null Hypothesis H_0 :

a. There will be no significant effect of low impact exercises with behavioral relaxation therapy in management on tremor, upper limb function and disability in patients with Parkinson's.
b. There will be no significant effect of conventional physiotherapy management on tremor, upper limb function and disability in patients with Parkinson's.
c. There will be no significant difference between effect of low impact exercises with behavioral relaxation therapy versus conventional physiotherapy management on tremor, upper limb function and disability in patients with Parkinson's.

5. Methodology:

Study Design : Randomized Control Trail with Two parallel groups trail design

The subjects will be randomly allocated by using block randomization method to either of the groups with allocation ratio 1:1

Sample Size :

G-Power 3.1.9.4 Software.

t tests – Means : Comparing Mean Difference between two independent means (two groups) and 2 Tailed

Effect size : 1.715 (9HPT Mean 3.80 & 6.20,SD 1.474 & 1.320) from previous study (Ravichandran et al., 2016) , α level :0.05, Power (1- β) : 0.95

Estimated Sample size : 20

Allocation Ration ($n_1 : n_2$) = 1

Sample size : 30 (with drop out 50%) ($n_1 = 15$ and $n_2 = 15$)

Study Setting : Hospital Based study in Hospitals in Srikakulam District.

Ethical approval will be taken from MRIIRS and the hospital(s) and study will be registered at Clinical Trail Registry of India (CTRI)

Inclusion Criteria :

- Diagnosed as Primary Parkinson's Disease by Neurologist and fulfill UK Parkinson's Disease Society Brain Bank clinical Diagnostic Criteria (Hughes et al., 1992)
- Hoehn and Yahr scale Stage III-IV of Parkinson's with Tremor dominating
- UPDRS III Motor task 21 (Action or Postural tremor of hand) score of 2 or 3 (Mild to moderate
- Age between 40 to 60 Years
- Medically stable and taking prescribed medication
- Agrees to participate in the study

Exclusion Criteria :

- Secondary Parkinson's syndrome, Parkinson's Plus syndrome patients
- With other severe co morbidities like lung, heart, kidney ,liver, dysfunction or cancer.
- Patients with serious mental illness or dementia.
- Patients with cognitive impairments.
- PD patients without tremors.

Variables :

Independent Variables

- Conventional Physiotherapy
- Low impact Exercises
- Behavioral relaxation therapy

Dependent variables

- Tremors
- Hand function
- Disease severity
- Relaxation

Procedure :

Patients diagnosed with Parkinson's by Neurologist and Parkinson's Disease Society Brain Bank clinical Diagnostic Criteria were approached and screened for the eligibility for the study.

Study objective and procedure will be explained to the patients and consent will be taken to participate in this study. Subjects will be allocated to either of the groups.

Base line assessment will be taken at beginning of the study.

Pre test measurements will be taken before starting the intervention.

Tremor : Fahn's Tremor Rating Scale (by blinding of outcome assessor) & Bain and Findley Tremor ADL Scale

Hand Function : 9 Hole peg test

Patient will be asked to place the pegs in peg board using his/her dominant hand in 50 seconds. The number of pegs placed in 50 seconds was used for evaluation.

Disease severity : Unified Parkinson's Disease Rating Scale (UPDRS), Part I – intellectual impairment, Part II – activities of daily living, Part III – motor examination (Brusse et al., 2005)

Relaxation : Behavioral Relaxation Scale (BRS)

Intervention :

Experimental Group : Low Impact Exercises + Behavioral Relaxation therapy

Control Group : Conventional Physiotherapy + Relaxation Exercise

Low Impact Exercises:

Along with the symptom based therapy participants will receive

- Movement repetitions with and with out auditory and visual cueing : Free movements of shoulder, elbow, wrist, trunk, hip, knee and ankle in sitting or supine lying
- **Graded Stationary cycling** for 30 – 45 min (including 15 min of warm up and cool down exercise) within predetermined Heart Rate Reserve (HRR) (van der Kolk et al., 2019)

  Heart rate reserve : Difference between resting heart rate and maximal heart rate

  Patients are instructed to cycle with in the target heart rate zone in self phased speed. In initial sessions patients are allowed to cycle at lower intensity to get adjusted with the equipments, exercise environment and protocol. Intensity will be gradually increased as patients became adjusted and fitter. The maximum limit of exercise intensity was set as 80% of HRR.

  Heart rate will be monitored with heart rate monitor continuously during the exercise session.

Behavioral Relaxation Technique (Schilling & Poppen, 1983)

Each BRT Session will take 30min approximately including adaptation, training and measurement. Each session is followed by post session assessment by Behavioral Relaxation Scale (BRS).

Patient will be seated in relaxed position on upright straight chair with back support.

Patients were instructed to practice 10 relaxed postures / activities shown by pictures or models. Patient will receive positive and corrective feedback from therapist for 15 to 20 min and followed by relaxation without feedback. During the session therapist prompts the one word name of a area that was identified un relaxed (eg. Fore arm) at tow minutes of interval. If all parts are relaxed, therapist will say “Good” or “Doing well”

Patients will receive intervention for 3 sessions per week for 6 weeks

Post test measurements will be taken after 6 weeks of intervention.

Conventional Physiotherapy Program (Cholewa et al., 2013) planned based on level of symptoms like bradykinesia , postural and gait difficulties and to improve still retained movement patterns. Patient will perform the exercise program under the supervision of therapist. Throughout the exercise session therapist will be next to the patient to prevent fall.

- Imitating various upper limb and lower limb free movements by seeing therapist/ video

- Postural corrections (observing and identifying improper posture and correcting)
- Mat activities i.e. rolling, lying to sitting, sitting to stand, weight shifts, trunk rotations in sitting etc.
- Stretching : Upper limb, Lower limb and Trunk muscles
- Teaching turn around : In supine lying position patient is instructed to moving upper limb and lower limbs in opposite directions and in same directions
- Gait training : Patient will follow verbal commands of therapist to improve on step length, base of support, cadence, direction change and walking over blocks. Teaching walking by following audio/visual cues to improve movement initiation, weight shift etc.
- Frenkal's exercise

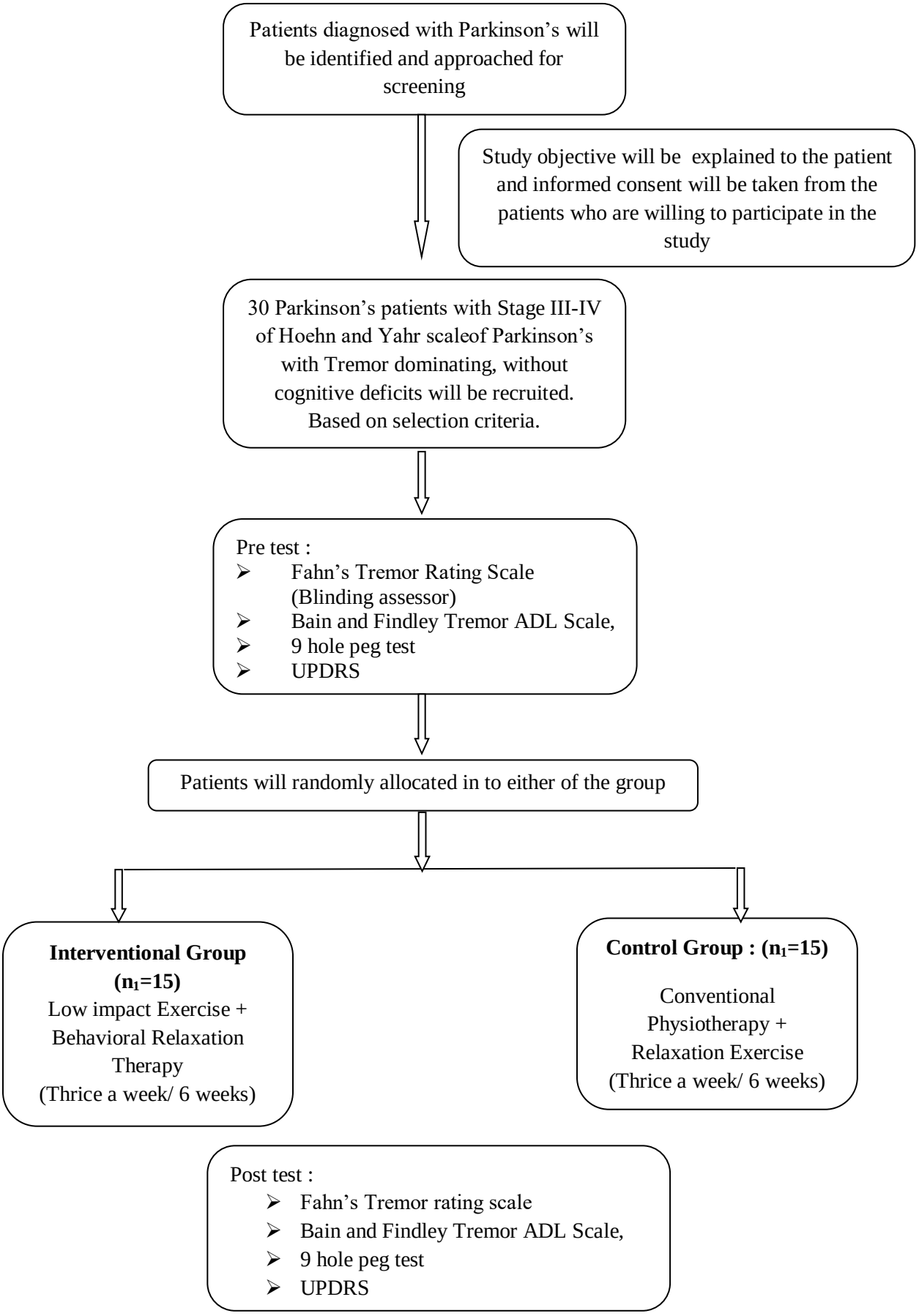
Progressive muscle relaxation (Hernandez-Reif et al., 2002): Patient will be in supine lying with listening audio instructions of exercise steps. In each Session patients is instructed to tightening and relaxing the larger muscle groups sequentially from feet to the face by following verbal/audio cues.

Each session is followed by post session assessment by Behavioral Relaxation Scale (BRS).

Termination of Participation :

If Participants develops any severe complications or deteriorates in medical fitness

Poor adherence of continuation of follow-up visits and prescribed exercises.


Patients diagnosed with Parkinson's will be identified and approached for screening
Study objective will be explained to the patient and informed consent will be taken from the patients who are willing to participate in the study
30 Parkinson's patients with Stage III-IV of Hoehn and Yahr scaleof Parkinson's with Tremor dominating, without cognitive deficits will be recruited. Based on selection criteria.
Pre test :
Fahn's Tremor Rating Scale (Blinding assessor)
Bain and Findley Tremor ADL Scale,
9 hole peg test
UPDRS
Patients will randomly allocated in to either of the group
Interventional Group (n_1=15)
Low impact Exercise + Behavioral Relaxation Therapy
(Thrice a week/ 6 weeks)
Control Group : (n_1=15)
Conventional Physiotherapy + Relaxation Exercise
(Thrice a week/ 6 weeks)
Post test :
Fahn's Tremor rating scale
Bain and Findley Tremor ADL Scale,
9 hole peg test
UPDRS

6. The expected outcome of the study:

1. Both the interventions may show effect in improving tremors in patients with Parkinson's
2. With reference to literature review, clinical experience and anedectol views low impact exercise and Behavioral relaxation therapy management may or may not improve tremors than only conservative management in patients with Parkinson's Disease.
3. i. If low impact exercise and Behavioral Relaxation Therapy proved to be effect, it can be used as an adjunct to pharmacological intervention in managing tremors in patients with Parkinson's Disease.

   ii. This training can be practiced at home by the patient him/herself with or with out supervision.

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